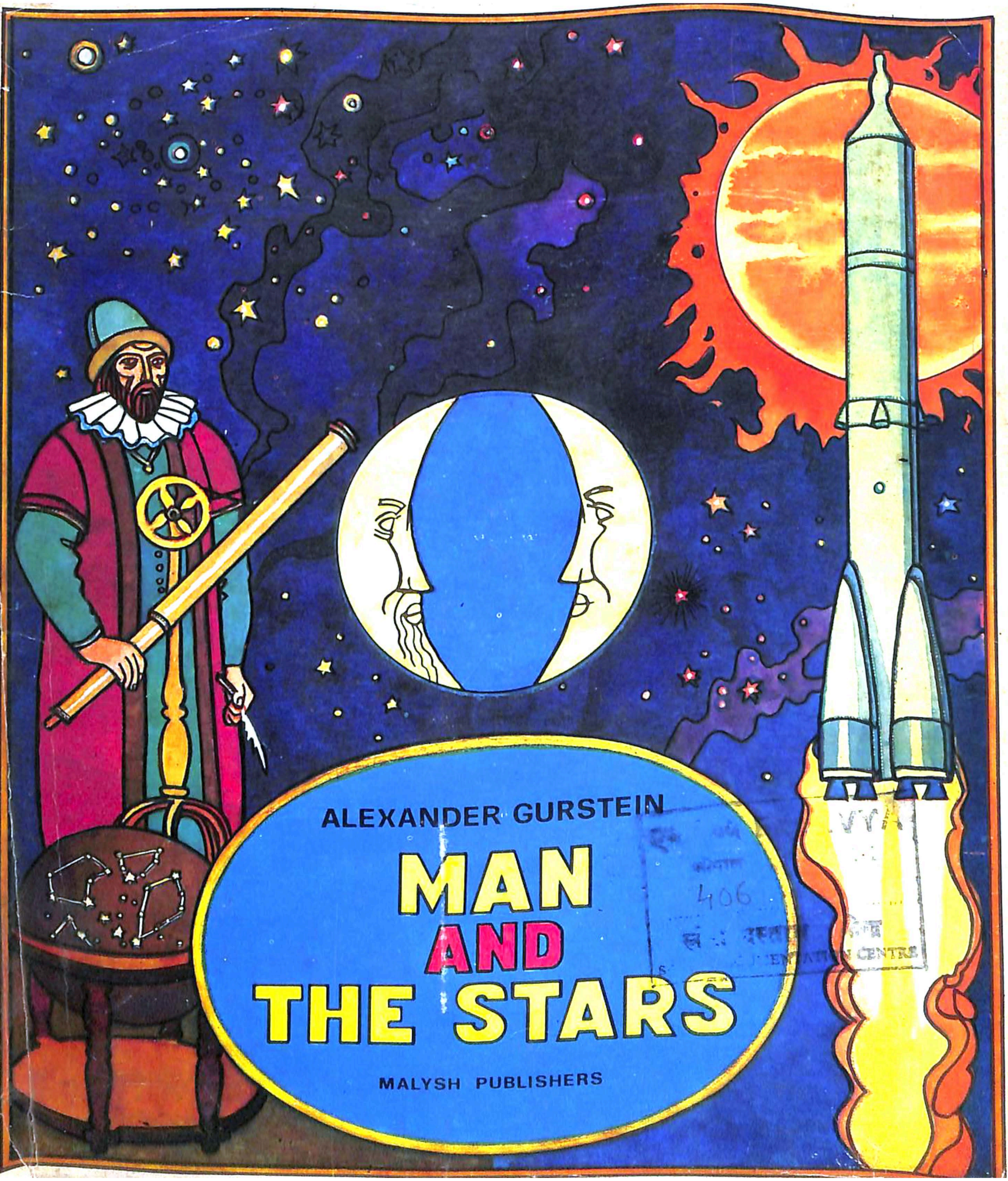

ALEXANDER GURSTEIN

MAN AND THE STARS

MALYSH PUBLISHERS

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CENTRE

When no clouds are in the sky, the world of the stars is open to you. I am sure you often look up and study the stars. Some of them are bright and can be seen by everyone. Others are dim and only people with sharp eyes can spot them. And there are even more far-off stars that nobody has yet been able to see. The world of stars and other heavenly bodies has no limits. We call this world the Universe.

In ancient times the heavenly bodies were studied by astrologers. These wise men observed the motions of the stars, the sun, and the moon. They noticed that the moon behaved strangely. First it appeared in the night sky as a full moon. After two weeks only a narrow sickle was left. Another two weeks passed, and a full moon again sailed across the sky.

The astrologers checked time by the moon. Roughly 30 days had to pass for the moon to complete its cycle from a thin sickle to a full moon and back to the sickle again. When a new moon appeared in the sky, the astrologers signaled to the trumpeters: "Let the trumpets blow! Let everybody know that a new month has begun!" You see, in Old English a month and moon meant the same thing. There are twelve brothers, or months, in a year, from January to December, since it takes the moon twelve cycles to comlete a year. We cannot change the length of a year because it consists of four seasons, spring, summer, autumn, and winter. There is no way in which we can shorten or lengthen these seasons. Winter is always succeeded by spring, and when nature completes its cycle, a new year arrives.

Many centuries had to pass before the astrologers could solve the riddle of the movements of the stars, the sun, and the moon across the sky.

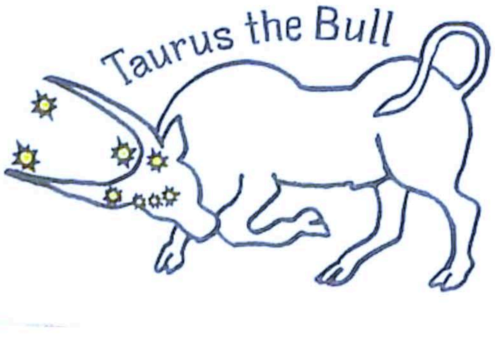
The people of those ancient times had no clocks like the ones that we all have now. There were no compasses either. The starlit night sky was their clock and compass. The astrologers used the moon to count the months. The seafarers used the stars to guide their ships. The most important stars were called the guiding stars.

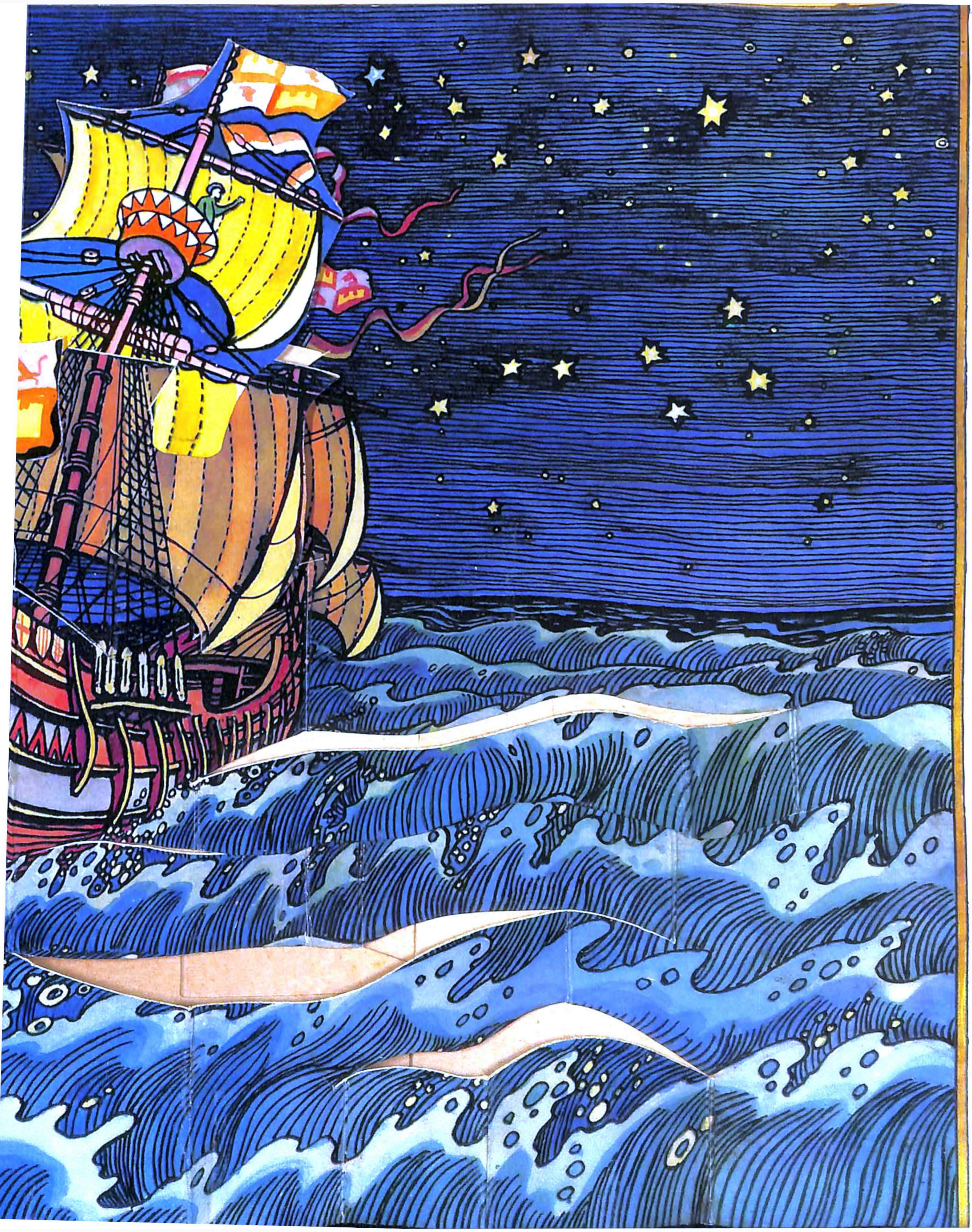
Look up at the sky on a starry night. Some of the pearl-like stars are far from one another, but others make up clusters and form fantastic patterns. In ancient times people isolated memorable groups of stars and called them constellations (stella means star in Latin).

There are several constellations in the sky. Their names are connected with many beautiful legends. The winged horse Pegasus is flying across the sky. Or the lovely Andromeda is rescued by the hero Perseus. Or the Herdsman is tending his invisible flock. Or the ferocious bull Taurus has lowered its powerful head over the curly-wooled ram Aries. Or the poisonous Scorpio is lying in wait for its victim.

In the course of a night some stars rise above the horizon while others drop behind it. But their positions in relation to one another do not change. The stars seem to be pinned to the sky. Night after night, year after year the constellations keep their outlines.

Many useful facts can be learned from observing the night sky. There is a whole science that studies the heavenly bodies in the Universe. This is astronomy. Thus astrologers came to be called astronomers.





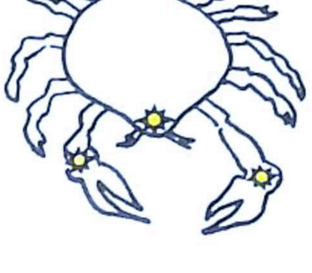
The astronomers wanted very much to look deep inside the Universe. But how could they? Was it possible at all?

Have you ever noticed what big green eyes a cat has at night? The pupils of a cat's eyes are much bigger at night than in the day. This is how the eyes of cats and other living creatures work: the weaker the light the bigger the pupils of the eyes. The pupils get bigger to take in more light. Then you can see better and farther.

So the whole problem is to collect more light. Astronomers were able to solve this problem by inventing a special spy-glass called a telescope.

A telescope has a big glass eye pointed at the sky. The bigger the glass eye the more light it collects. By looking into the telescope astronomers found heavenly bodies that could not be spotted with the naked eye. The telescope helped astronomers to understand what place our earth occupies in the Universe.

Cancer the Crab



Suppose that you are reading a book under a strong lamp. It seems very light in the room. But if you go outdoors, the light in the window of your room will appear dim. It will become one of the many lights in other windows. If you walk farther away from the house, the light of the strong lamp will become indistinguishable from the other lights and will merge with them into a weak glow.

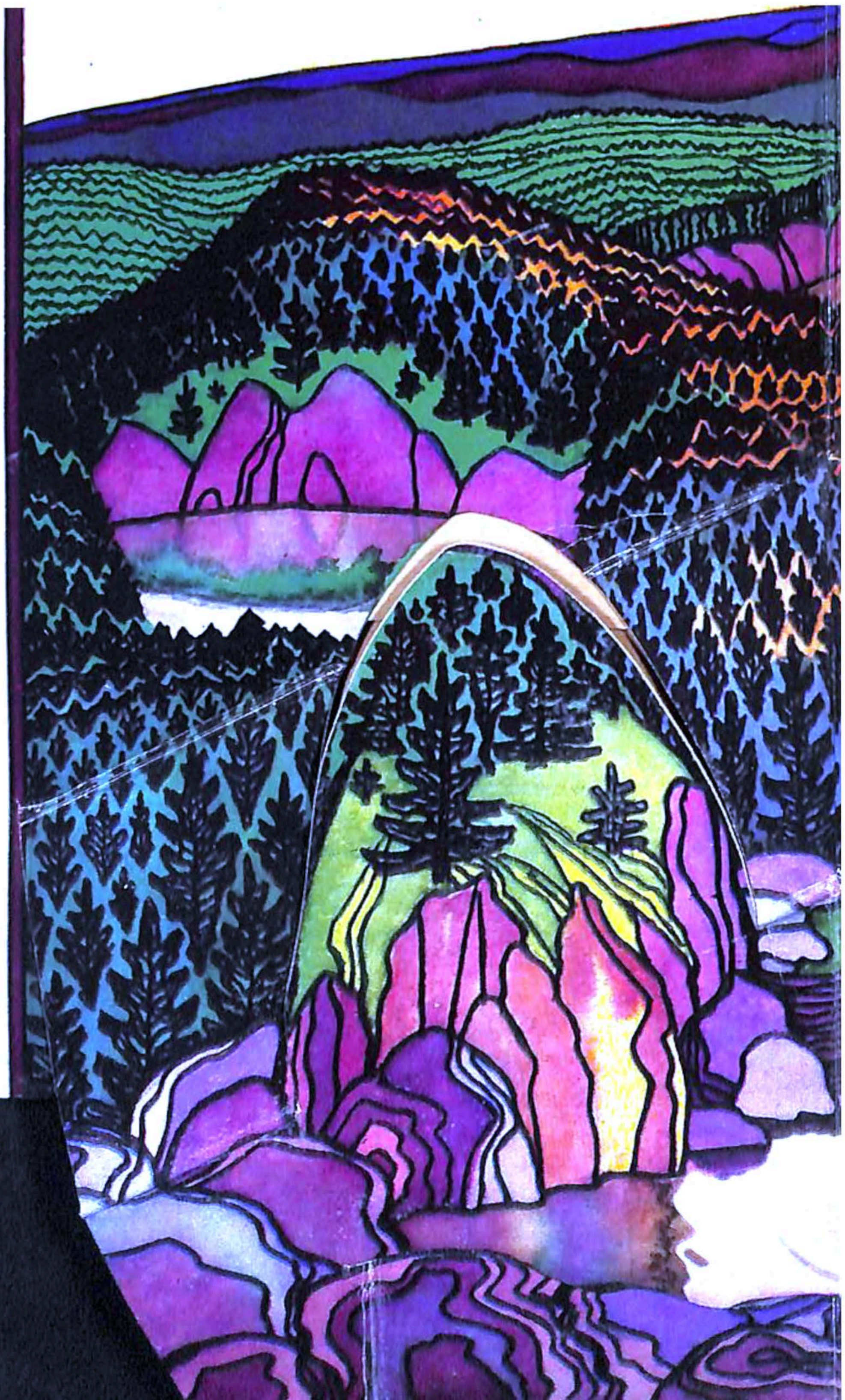
Stars seem like pin-points of light only because they are far, far away from us. In reality they are huge and bright, tremendous fireballs. A star gives off light for thousands of millions of years.

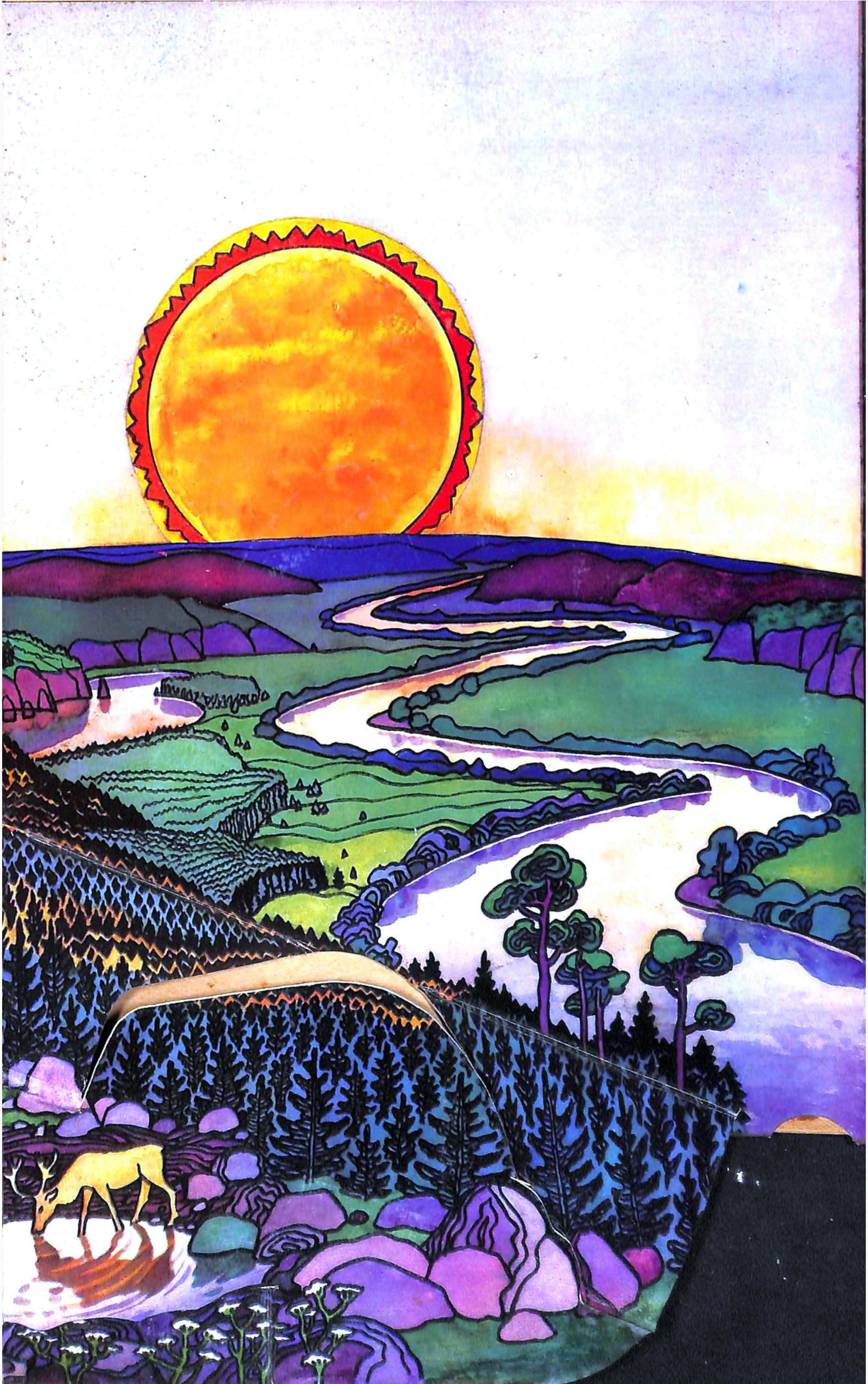
The sun, too, is a huge blazing star. It is like the other stars. It seems brighter than all the other stars simply because we look at those stars from a much greater distance just as we look at the lights in the windows of a distant house, but the sun shines like a lamp in our room. After all, we live close to the sun, almost next to it.

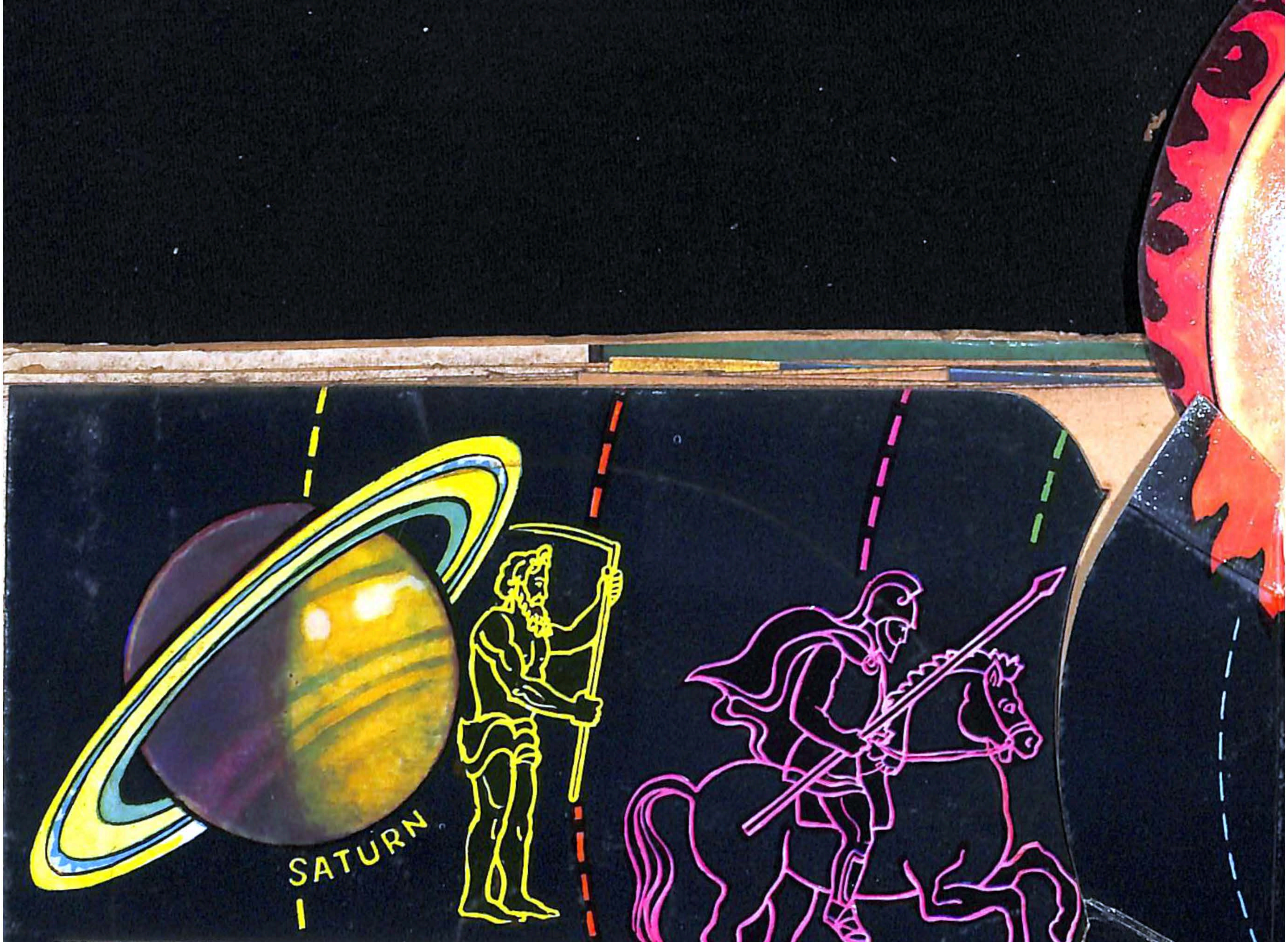
For us the sun is the closest and the most important star. It sends us light and warmth. When the sun rises, day begins. When the sun sets, night comes. The change of the seasons also depends on the sun.

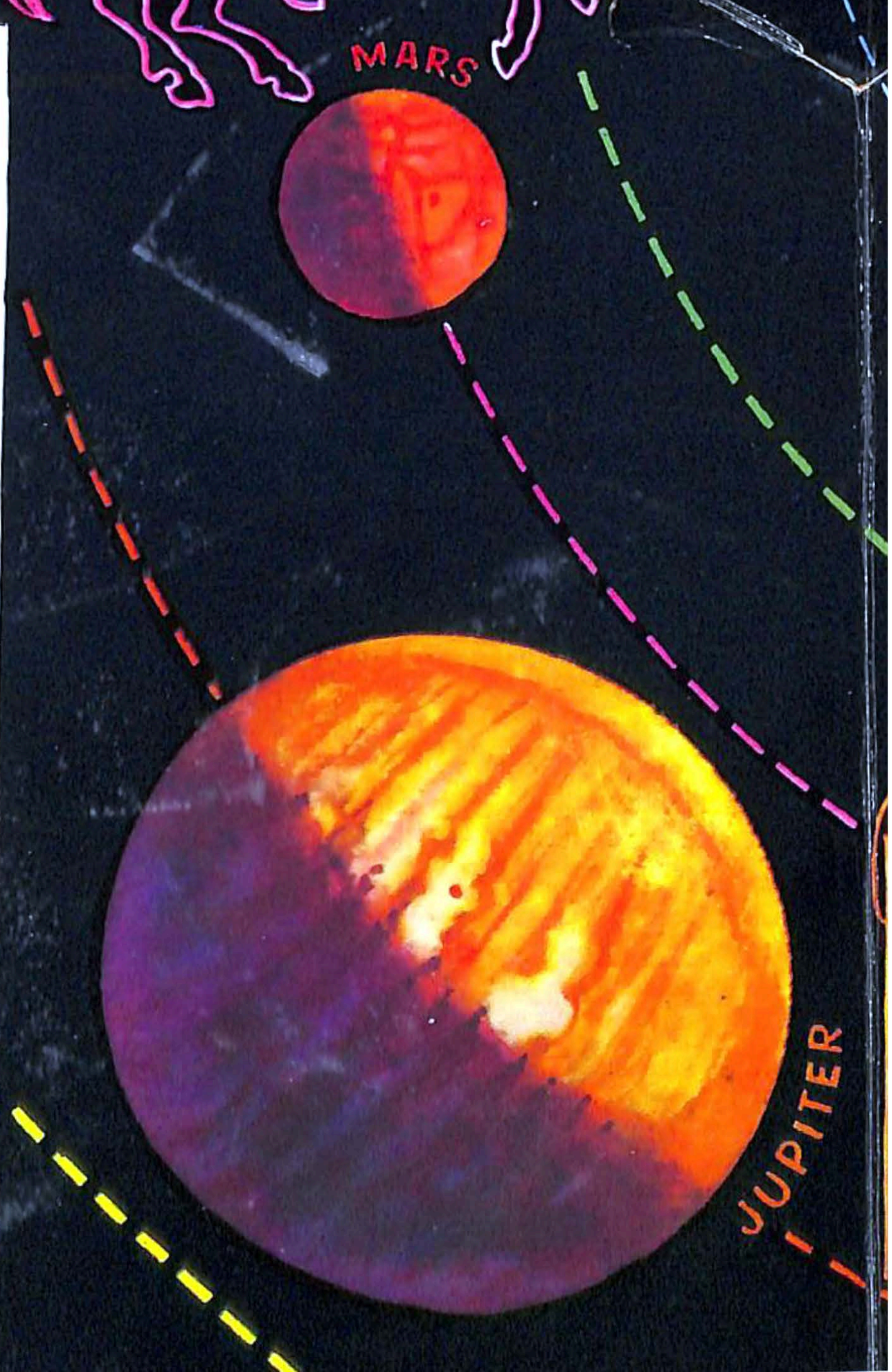
If you now turn the page, you will discover that the sun is surrounded by other heavenly bodies. From the earth these look at night just like other stars. They are called planets.

Leo the Leon







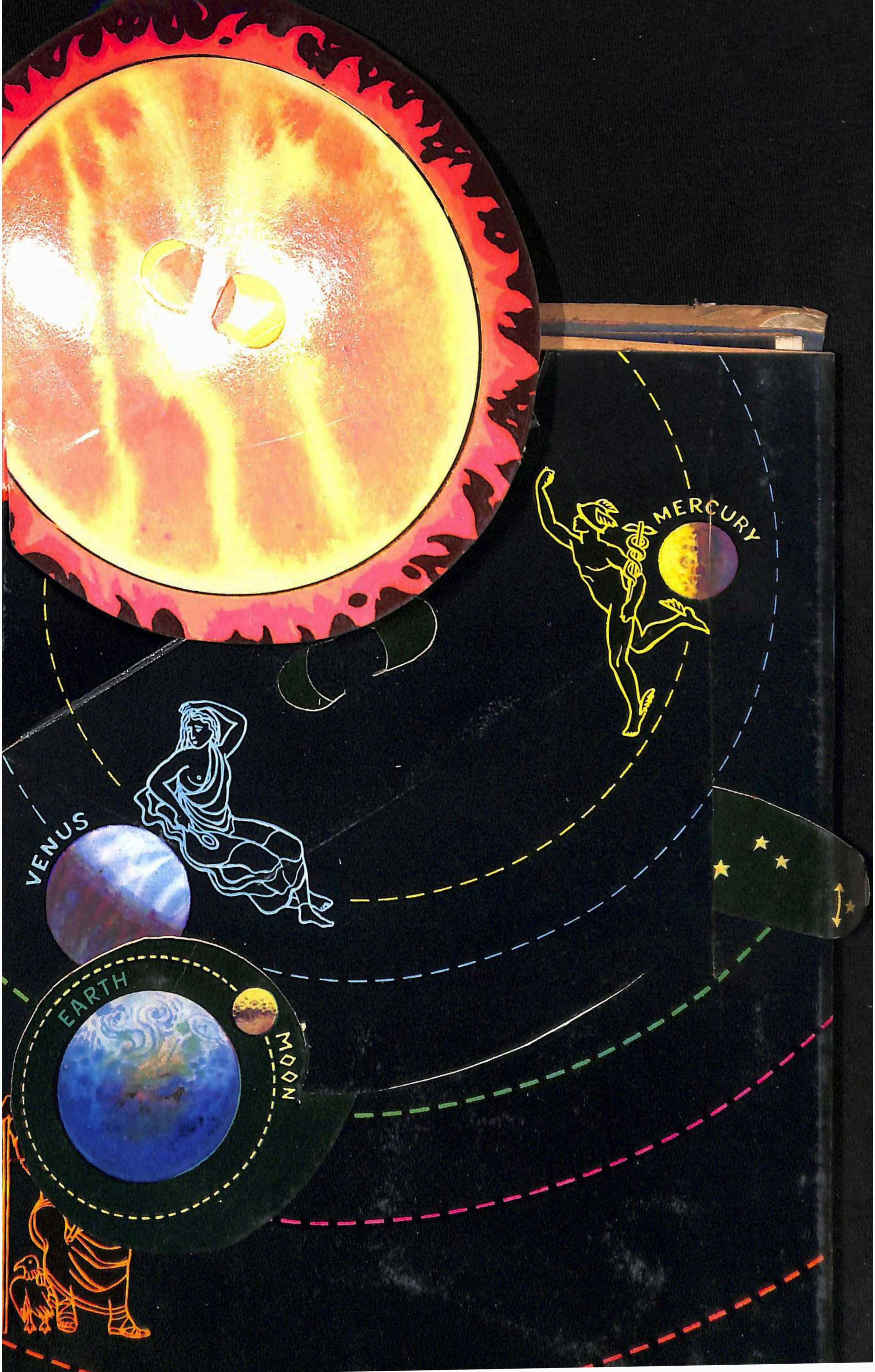


To us it seems as if the sun travels around the earth, but it is just the opposite. The earth is constantly in motion around the sun. We do not notice its motion simply because it moves very smoothly through space.

Our earth is a planet. Like a star, it is round, but much smaller than any star. If placed beside a star, the earth would look like a tiny grain beside the huge head of, say, a lion. The planet Earth is a hard, cold ball heated by the sun. It is only one of a whole family of planets revolving around the sun: Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. These planets were named after the gods in whose existence ancient people believed.

All the planets together with the sun make up what we call the solar system.

Libra the Balance


MERCURY
VENUS
EARTH
MOON

Suppose that you have a friend that lives in the same neighborhood. This is really nearby. But if that friend lived in another part of the city, you would consider that far away. And if he lived in another city, that would be farther still. You might even have to take a train to visit him. So you see, it is not enough to say just "near" or "far." It is better to say how near or how far.

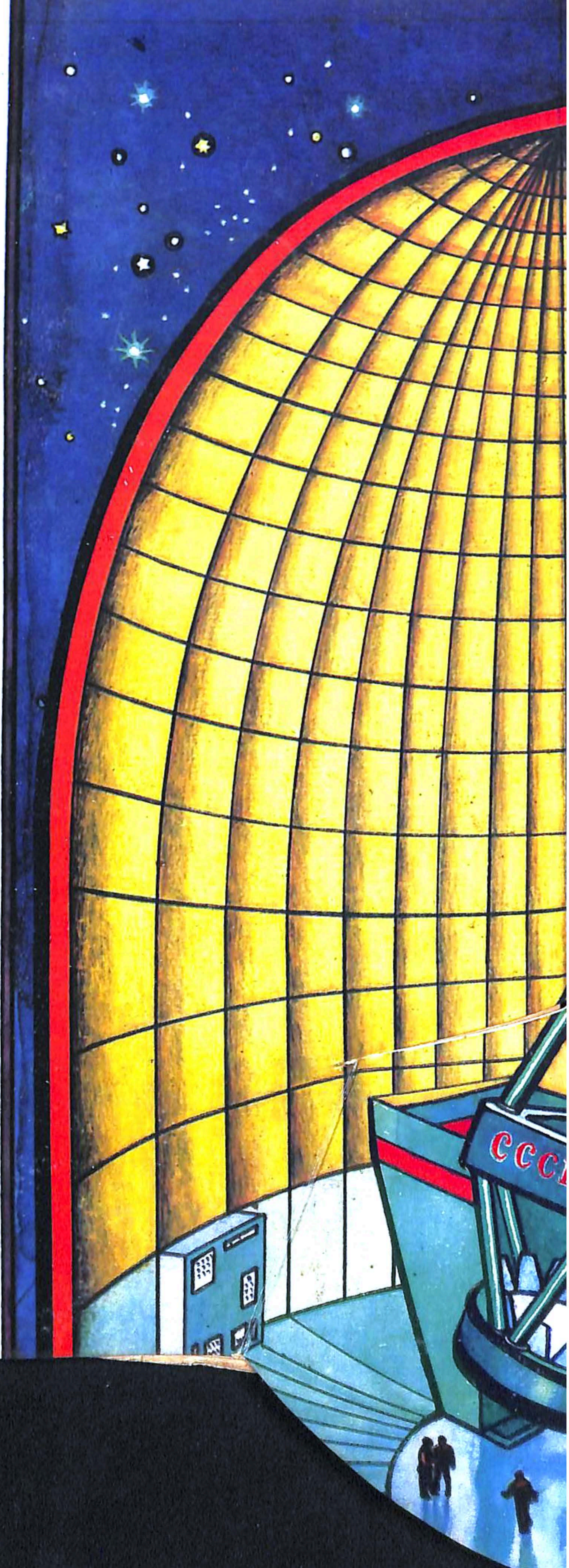
To explain who lives where, we give the exact address, the number of the house, the street, and the city. But how do we write the address of the earth in the boundless Universe?

Our common house is the earth. As for the street, there are no streets in the Universe. But if the Earth, Mercury, Venus, Mars, Jupiter, and the other planets surrounding the sun are separate houses, then the solar system is the street. On this street the "houses" stand far apart, and so our "street" is very long. But a city must be much, much bigger. So what will we call a city in the Universe?

The city is an immense collection of stars, including the sun. This city of stars is called the Galaxy. The Galaxy is so immense that the solar system is just a tiny speck in comparison. So you see how enormous our city of stars is. And the Universe contains many such cities. You already know that the Universe has no boundaries.

Astronomers have been able to look into the depths of the Universe through telescopes. The biggest telescope in the world has been put up in the Caucasus Mountains in the USSR. It would take ten grown-ups standing in a ring and holding hands to encircle the tube of this telescope.

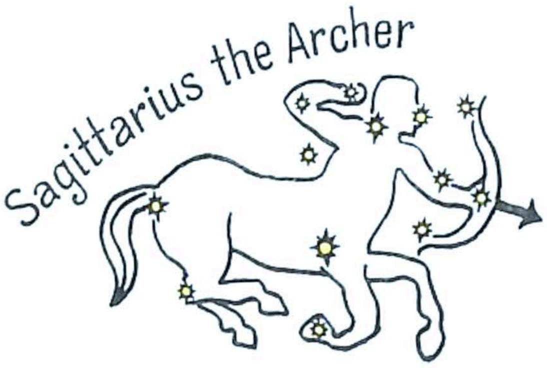
What can the planets and stars tell us?

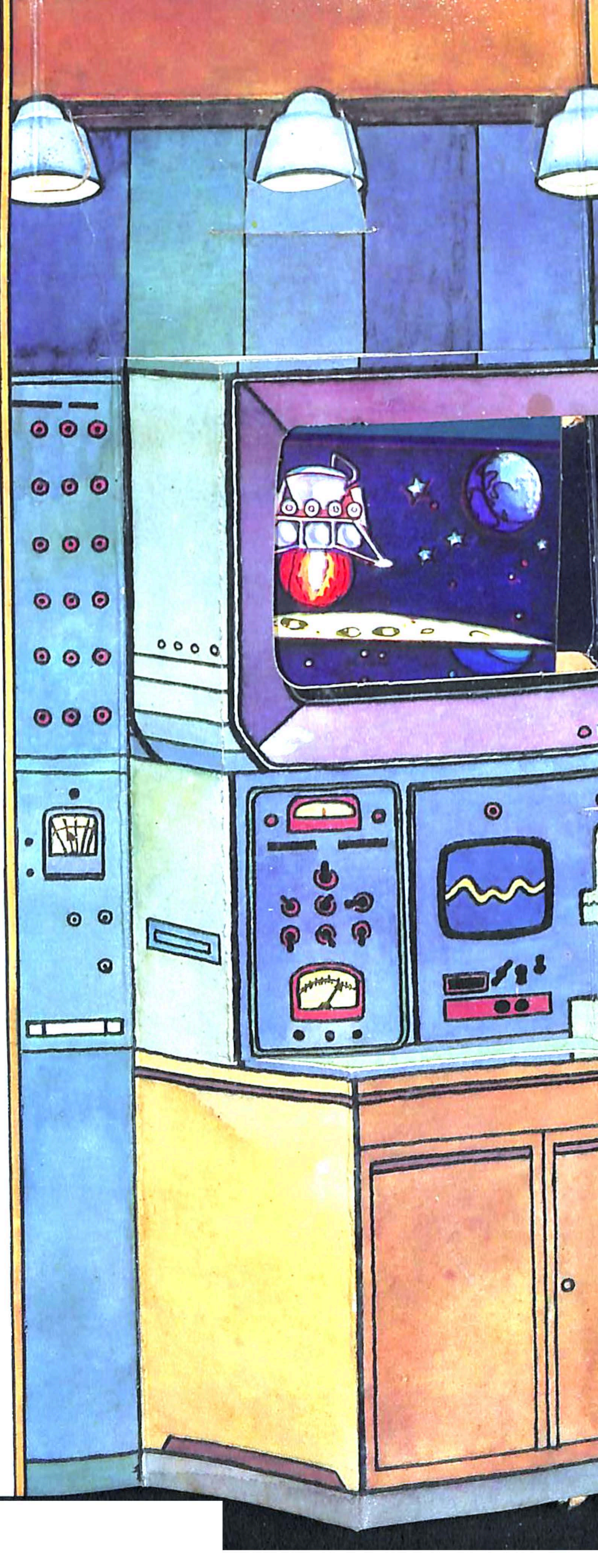


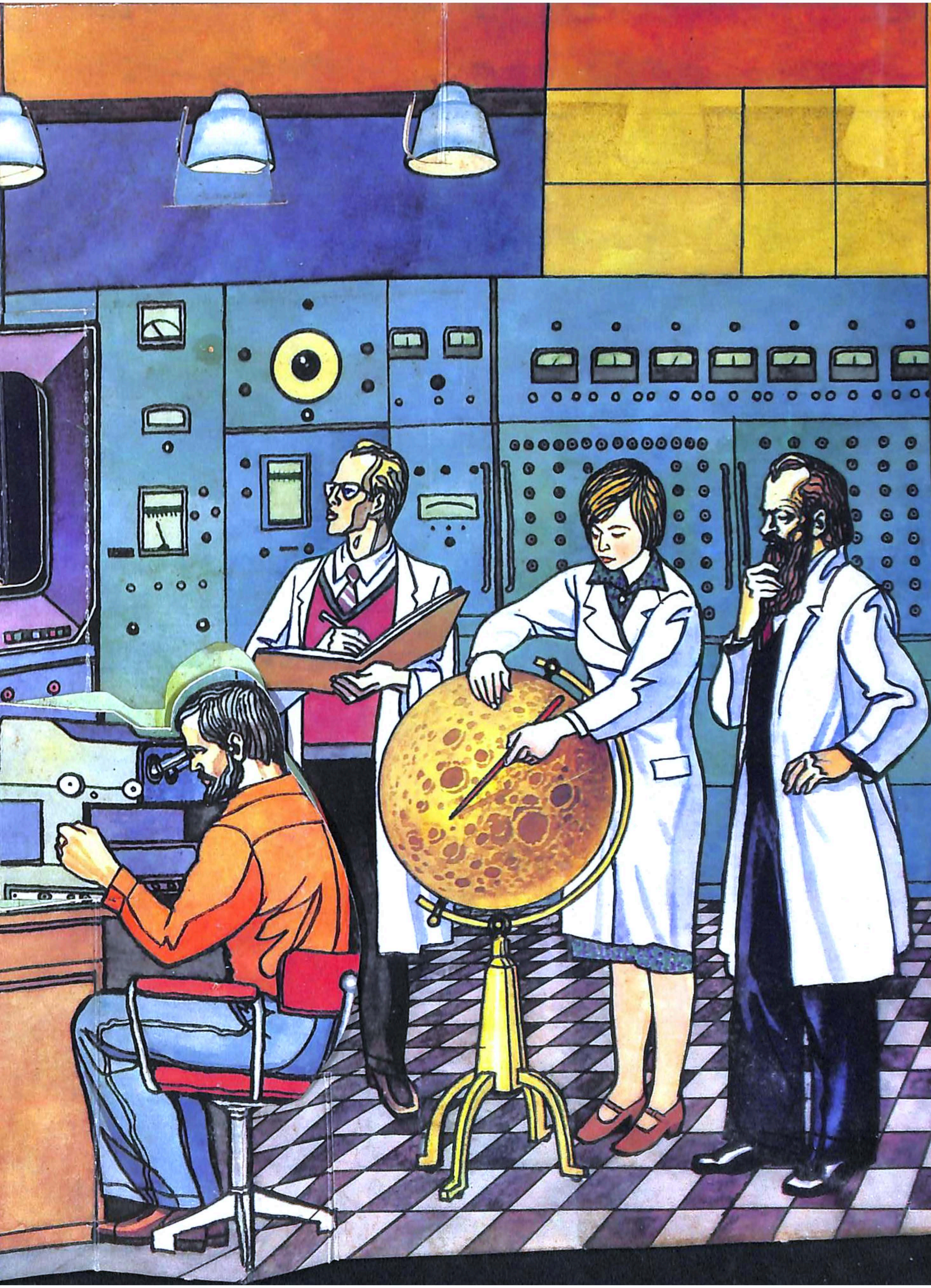
The depths of the earth hide many secrets. Underground seas of hot water, for example, lie deep inside. Would it not be wonderful to tap this source of heat? And would it not be wonderful to be able to predict earthquakes, hurricanes, or the giant ocean waves, tsunami, so as to send out warnings to the people in the danger areas in good time?

By studying the planets and stars we can open up other secrets of the earth, too, and learn how to make better use of the earth's riches.

Astronomers point their telescopes at the stars to find out how stars can blaze for thousands of millions of years without burning up. They want to know, too, where the stars get their light and heat. How fine it would be if we could construct such a wonderful furnace on the earth and put a tiny piece of a star into it! Just a tiny spark from the fire blazing on the stars would be enough to replace thousands of giant power-stations.





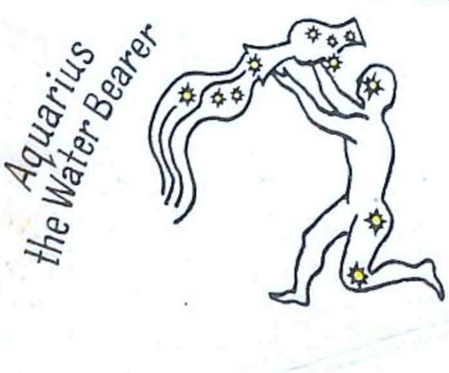


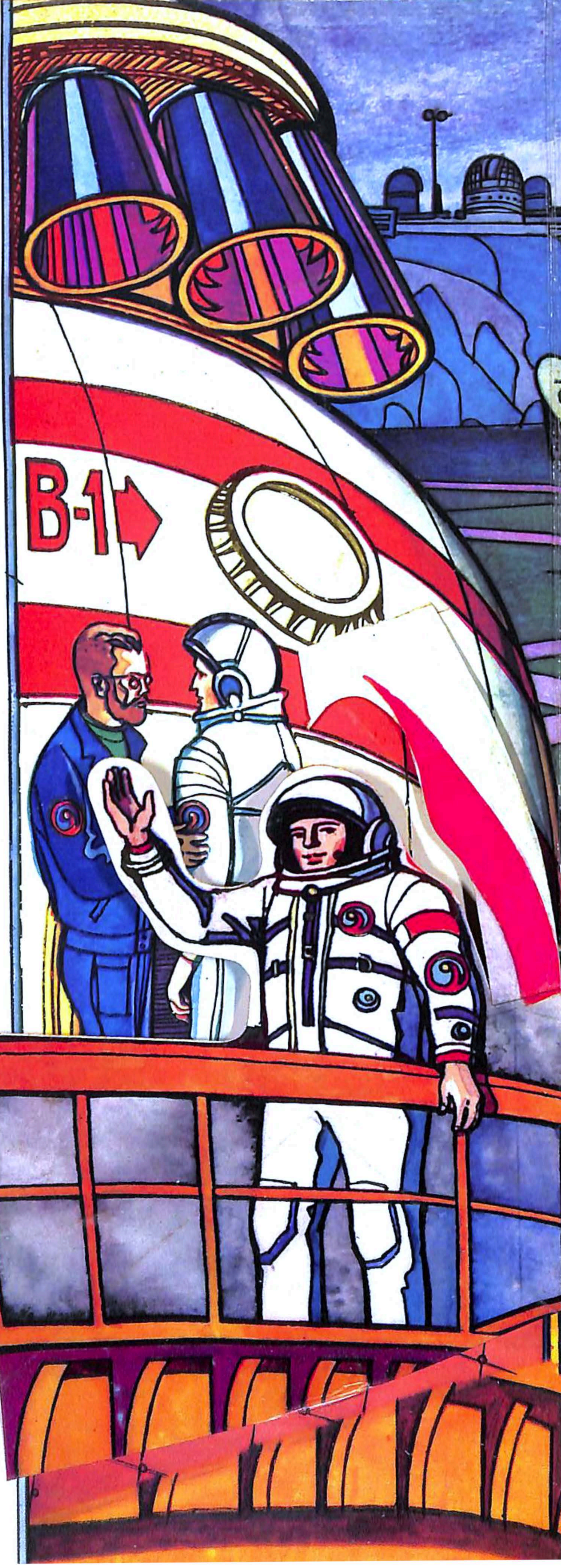
You probably know how enthusiastically people who travel in space are greeted on their return to the earth. People of many countries and continents have visited outer space. Among them are Russians, Americans, Frenchmen, a Czech, a Pole, a Hungarian, a Vietnamese, a Cuban, and an Indian. But in the spring of 1961 the very first to visit space was the Soviet astronaut Yuri Gagarin. In many countries this event is celebrated annually on the 12th of April as Astronautics Day.

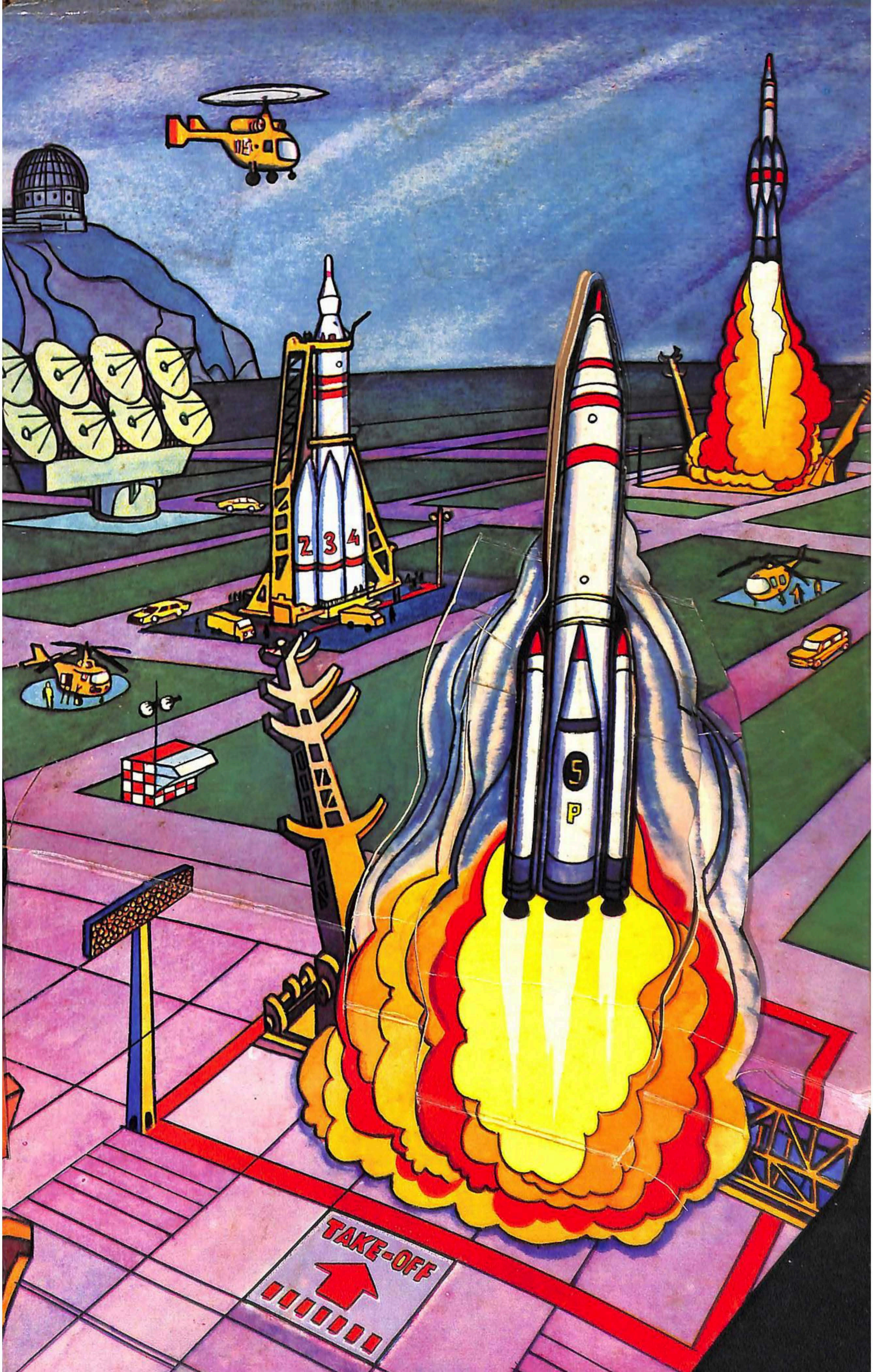
Until recently the success of astronomers depended on whether the sky was free of clouds. But when the space age arrived, telescopes could be mounted on spacecraft and lifted high above the clouds. In airless space, far from the earth, there are no such obstacles to observation as clouds, dust, or air currents.

Now automatic space probes have given astronomers the hands to reach out to other planets. Special spacecraft have brought back to the earth samples of lunar rock, and TV cameras have let people feel that they themselves have walked on Mars and Venus.

Astronomers have made many important discoveries in studying the planets and stars. But there is still more to discover. The great Russian scientist Konstantin Tsiolkovsky was sure that man would step outside the boundaries of the solar system and move on to the stars. Some day his dream will come true. And you, my dear reader, will most certainly not only witness these events but also take part in great new discoveries.



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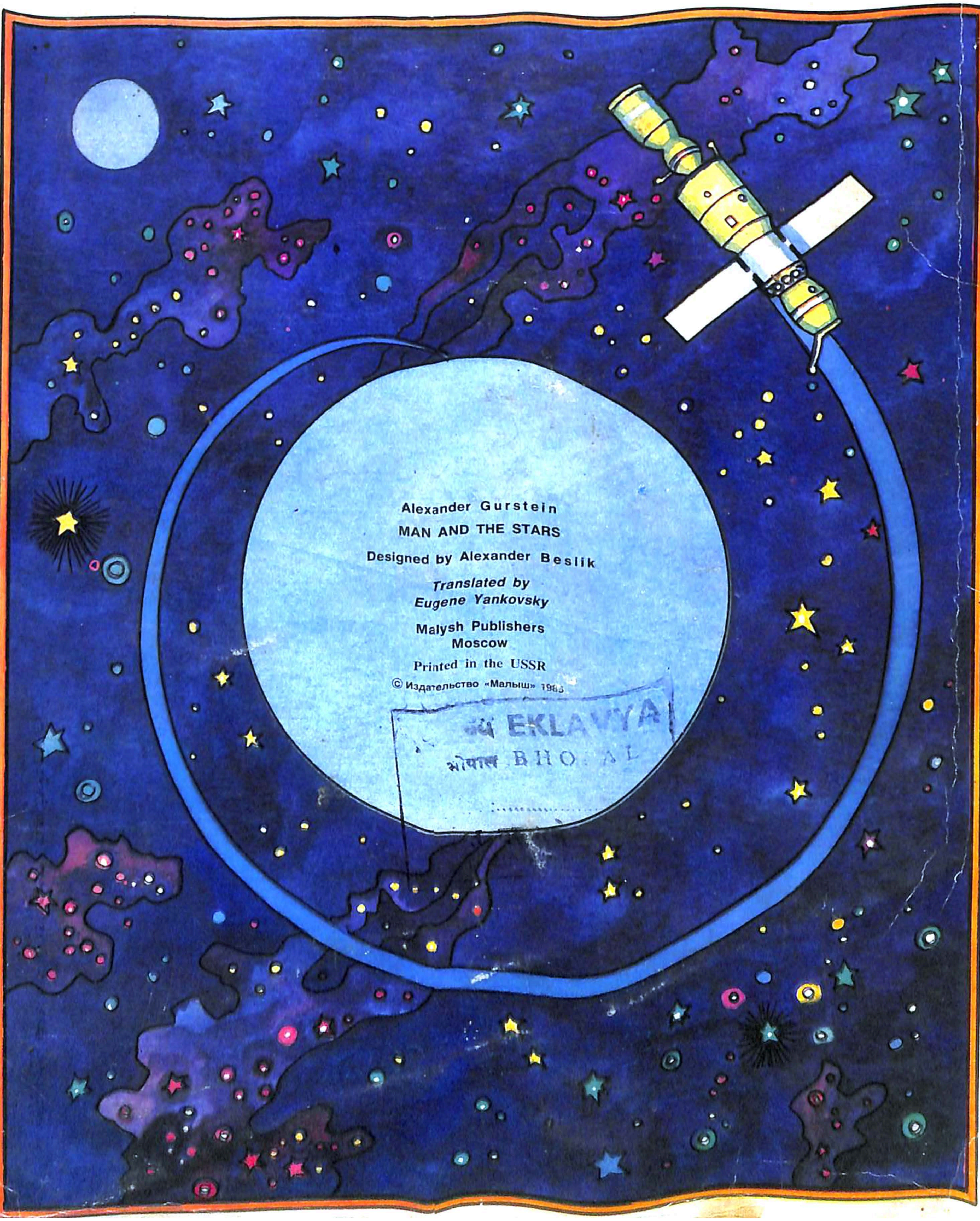

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